



RAPID RIVER HATCHERY

1989 Brood Year Report



by

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ABSTRACT

The Rapid River returning adult trap was in operation from March 27 through September 11, 1989. During this time, 2,800 spring chinook (Oncorhynchus tshawytscha) were collected. This total was comprised of 2,372 adults and 428 jacks. Incidental trapped summer chinook totaling 69 adults and 13 jacks were released back into Rapid River adjacent to the hatchery complex. Additionally, there were 81 adult steelhead (O. mykiss) trapped, of which 13 were of hatchery origin and 68 were of wild origin. Once again this year, Hells Canyon spring chinook (86 adults and 2 jacks) were combined with Rapid River returns.

Overall prespawning mortality was 11.32% (315 fish). Spawning operations began on August 2 and continued through September 13, 1989. A total of 1,082 females were spawned, having an average fecundity of 4,137 eggs/female. These fish yielded 4,478,045 eggs. Survival to eye-up was 93.05%.

Approximately 4 million swim-up fry were transferred to the raceways for early rearing during the period January 23 through March 6, 1990. Final rearing culminated with 2,564,900 smolts planted in Rapid River, 100,100 in the Little Salmon River, and 500,500 planted in the Snake River.

Overall feed conversion for the 1989 Brood Year fish was 1.51. The cost per pound of 1989 Brood Year fish produced was \$3.95 (\$0.166 per smolt released).

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INTRODUCTION

Rapid River Hatchery was constructed in 1964 by the Idaho Power Company (IPC) as compensation for losses of chinook salmon (Oncorhynchus tshawytscha) resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. Mitigation, as required by the Federal Energy Regulatory Commission, required that IPC transplant the run of chinook from the Snake River to the Salmon River drainage and to provide funds for the production of 3 million spring chinook smolts annually. These fish are designated for release into Rapid River and the Snake River below Hells Canyon Dam.

LOCATION

Rapid River Hatchery is located in Idaho County, approximately seven miles (11.2 km) southwest of the community of Riggins, Idaho on Rapid River - a tributary of the Little Salmon River. Rapid River Hatchery is staffed and operated by the Idaho Department of Fish and Game (IDFG) and completely funded by IPC.

OBJECTIVES

The objectives of Rapid River Hatchery are to:

1. Produce 3 million spring chinook smolts at an average size of approximately 20 fish per pound (44.1 per kg) for release into Rapid River and the Snake River below Hells Canyon Dam.
2. Trap and spawn adult spring chinook salmon returning to Rapid River.
3. Evaluate various strategies and techniques for rearing spring chinook salmon.
4. Provide eggs and/or fry for supplementation purposes.

FISH REARING/HOLDING FACILITIES

Fish rearing facilities at Rapid River Hatchery consist of 50 double stack Heath incubator trays, 12 outdoor concrete raceways (6 ft x 90 ft), and 2 earthen rearing ponds with concrete side walls: Pond 1AB (84 ft x 199 ft), Pond 2AB (36 ft x 371 ft), and Pond 2CD (36 ft x 371 ft). One concrete adult holding pond (80 ft x 25 ft) and two earthen holding ponds, Adult Pond No. 2 (40 ft x 150 ft), Adult Pond No. 3 (80 ft x 250 ft), provide space for holding up to 10,000 adult salmon for spawning (Table 1 and 2).

Table 1. Rapid River Hatchery production capacity data.

Rearing/Holding Area	Volume	Carrying Capacity
Heath Incubators	768 Trays	7.7 million eggs
Raceways (12 ea)	1,890 cu ft (ea)	500,000 fry (ea)
Rearing Pond No. 1	57,600 cu ft	1 million smolts
Rearing Pond 2.	82,000 cu ft	2 million smolts
Adult Pond No. 1	12,000 cu ft	1,000 adults
Adult Pond No. 2	24,000 cu ft	3,000 adults
Adult Pond No. 3	80,000 cu ft	6,000 adults

Table 2. Rapid River Hatchery rearing/holding area volumes.

Rearing/Holding Area	Volume
Rearing Pond No. 1A	28,800 cu ft
Rearing Pond No. 1B	28,800 cu ft
Rearing Pond No. 2A	21,700 cu ft
Rearing Pond No. 2B	19,300 cu ft
Rearing Pond No. 2C	19,300 cu ft
Rearing Pond No. 2D	21,700 cu ft
Adult Pond No. 1	12,000 cu ft
Adult Pond No. 2	24,000 cu ft
Adult Pond No. 3	80,000 cu ft

The adult trapping facility, located on Rapid River approximately 1.5 miles (2.4 km) downstream from the hatchery, is equipped with a permanent wooden velocity barrier, a three-step fish ladder, and a two-stage trap. Adult salmon are transferred from the trap to a 1,000-gallon tank truck for transport to the hatchery by means of an Alaska Steep Pass ladder and a 500-gallon bucket operated by an overhead hoist.

Recommendations

The following hatchery improvements are recommended.

1. Construct a concrete broodstock holding pond with facilities to sort and spawn adult Chinook salmon.
2. Modify rearing ponds or construct an additional raceway rearing area to facilitate marking all hatchery fish, and to provide research rearing space for future fish management purposes.
3. Add a low water alarm system to prevent possible fish mortality.

4. Fabricate raceway baffles to provide a better rearing environment for the early rearing of spring chinook salmon.
5. Repair or replace the fish sorting chute located at the adult fish trap.
6. Modify the water inlet system to rearing pond 1 to facilitate drying up raceways when not in use.
7. Replace the water control system at the fish trap.
8. Modify the drain pipe system to include a settling pond site located at the old Columbia River Project (CRP) pond.
9. Update the hatchery domestic water supply to ensure clean, potable water for hatchery residents and public restroom and drinking facilities.
10. Replace/modify the piping and diversion for "back-up gravity flow incubation system.

WATER SUPPLY

From its origin in Adams County, Rapid River flows through a pristine canyon before reaching the hatchery. Under inclusion in the Wild and Scenic Rivers Act, the Rapid River drainage has not been subject to perturbations, such as logging and road building, and consequently provides an excellent water source for rearing chinook. Water quality parameters are listed in Table 3.

Table 3. Water quality analysis, Rapid River, March 1989.

Parameter	Suggested Range	Observed Level
Total Hardness as CaCO ₃	5.0 - saturation	74.003
Alkalinity as CaCO ₃	10 - 400	62.0
Dissolved Oxygen	5.0 - saturation	13.0
Ammonia (NH ₃)	< 0.0125	0.003
pH	6.5 - 8.0	7.3
Total Hardness as CaCO ₃	10 - 400	74.0

Hatchery water is obtained through one 30-inch (76.2 cm) and one 24-inch (61.0 cm) pipeline. A 5-foot (1.5 m) high wooden diversion dam provides the necessary hydraulic head to supply the hatchery with approximately 30 cubic feet per second (cfs) of water. Except for the incubators, all systems operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5-horsepower electric pumps. A gasoline-operated back-up pump and a filter bed system provide water during electrical failures.

STAFFING

The permanent hatchery staff consists of a Hatchery Superintendent III, a Hatchery Superintendent I, and a Fish Culturist. Approximately five seasonal employees are hired each year from February through November. The Summer Youth Employee Training Program also provides one or two employees to assist with grounds maintenance, etc. Housing accommodations include three residences for the permanent staff and a mobile home for the seasonal employees.

ADULT COLLECTION

Spring Chinook Returns To Rapid River

The adult trapping facility was in operation from March 27 through September 11, 1989. Spring chinook totaling 2,800 (2,372 adults and 428 jacks) were collected between May 16 and August 1, 1989, with the peak of the run occurring June 1-7, 1989 (Appendix 1).

The sex composition ratio of the run was composed of 1,151 adult males, 1,221 females, and 428 jacks. Age class composition, determined by fork length measurement (Appendix 2, Appendix 13), indicated 428 (15.28%) three year olds, 1,993 (71.13%) four year olds, and 379 (13.54%) five year olds.

All spring chinook, including jacks, were given a single subcutaneous injection of water soluble Erythromycin Phosphate at the rate of 5 mg active Erythromycin per pound of fish. Powdered Erythromycin Phosphate (80% active) was used this year to make the injectable stock solution. All spring chinook were transported to the hatchery after being injected, checked for injuries, and measured to the nearest centimeter fork length.

Throughout the trapping period, injuries totaling 440 were documented. These injuries were comprised of 36 gaff wounds, 226 nitrogen burns, 153 gill net scars, and 25 injuries of unknown origin. Two trapping/handling mortalities were recorded.

Snouts from 179 coded wire-tagged (CWT) fish were collected and sent to Lewiston this year. Coded wire tags were found in 25 of the jacks, 107 of the four year olds, and 47 of the five year old fish. These fish were tagged as part of the U.S./Canada agreement to determine Idaho's contribution to the ocean harvest.

Hells Canyon Spring Chinook

Spring chinook totaling 86 adults and 2 jacks were transferred to Rapid River Hatchery from the IPC Oxbow/Hells Canyon project. At the time of ponding in the HP-2 pond, neither of the runs of fish had developed enough secondary sexual characteristics to distinguish between males and females. Other specific

data pertaining to run timing, injuries, length frequency, etc. is available in the annual report from the Oxbow Hatchery.

Inventory of Miscellaneous Species

Salmon entering the trap after July 18, 1989 were classified as summer chinook, except adipose-clipped fish. A total of 82 summer chinook entered the Rapid River trap from July 18 through August 28, 1989 (Table 4). The sex composition ratio of these fish was: 41 adult males, 28 females, and 12 jacks. All summer chinook were transported from the trap facility and released into Rapid River above the hatchery intake structure.

Other species trapped this season included 170 bull trout (Salvelinus confluentus) and 81 adult steelhead. The steelhead count was comprised of 5 males and 8 females of hatchery origin, and 22 males and 46 females of wild origin (Table 10). All hatchery fish were transported to the Little Salmon River and released approximately one mile above the confluence with Rapid River. All wild steelhead were transported and released above the hatchery intake structure.

Table 4. Inventory of miscellaneous species.

Species	Number Trapped
Summer Chinook	82
Steelhead	81
Bull Trout	170

HARVEST DATA/SPORT AND INDIAN FISHERY

In 1989, no sportsman harvest of spring chinook occurred due to IDFG season closure restrictions on the Little Salmon River. Harvest data reported by the Nez Perce Tribe indicated that 461 chinook were taken by the Indian fishery.

PRESPAWNING MORTALITY

A total of 2,888 spring chinook salmon (excluding two trap mortalities) were held at Rapid River Hatchery this year. This total was composed of 2,800 fish trapped in Rapid River and 88 fish collected at Hells Canyon. All fish were held in HP-2.

Prespawning mortality was 315 fish from Rapid River returns (11.25% of the Rapid River run). Renibacterium salmoninarium, or Bacterial Kidney Disease (BKD), lesions were visible on 20 of these fish (6.35% of the prespawning mortality). The prespawning loss sex ratio included 140 males and 175 females

from the Rapid River run. Hells Canyon returning fish mortalities consisted of six males and two females totaling eight fish (9.09% of the Hells Canyon returns). Treatments with Formalin at the rate of 80 to 100 ppm for 1 hour, three days per week, were initiated in the HP-2 system on June 19 through August 16, 1989. The treatments were very effective in reducing fungus problems.

CHINOOK SPAWNING

Spawning operations began on August 2 and continued two days per week through September 13, 1989. Rapid River returning fish were combined with those from Hells Canyon, so there is no differentiation between spawning operations. A total of 1,082 females were spawned to produce approximately 4,478,045 eggs which exhibited an average eye-up of 92.73%. Twenty-eight females were destroyed prior to spawning due to poor egg quality, bloody ovarian fluid, symptoms of BKD, etc.

Spawning protocol used in 1989 included placing the eggs from two females in a colander to drain off the ovarian fluid. Eggs were transferred to a bucket, fertilized with milt from two males, and mixed with approximately one cup of well water to activate the sperm. A random selection of jacks, representing 1-2% of the males, were used to fertilize the eggs. The eggs from each bucket were water-hardened for 30 minutes in a stock solution of a minimum of 100 ppm of buffered Argentyne. Heath vertical incubators were used for incubation.

CARCASS DISPOSITION

During 1989, all non-salvageable carcasses from spawning and daily mortalities were collected twice a week and hauled to a landfill near Grangeville, Idaho, by the Walco Company.

Snouts from 180 "adipose-clipped" chinook carcasses were collected throughout the spawning season and sent to the lab for tag recovery. Specific recovery data will be available at a latter date.

EGG INCUBATION

Beginning the fourth day of incubation, all egg lots were treated with Formalin to retard fungal development. Treatments were administered three times per week at a 1:600 concentration for 15 minutes, and continued until each egg lot accumulated 800 temperature units (TU's).

Eye-up occurred at approximately 500 TU's, at which time all eggs were shocked and picked using the salt flotation method. The volumetric displacement method was then used to calculate egg size and numbers. Hatching occurred at approximately 1,000 TU's, at which time all egg lots were "secondarily" picked.

Swim-up fry were transferred to the early rearing raceways at 1,700 to 1,900 TU's. Survival from green eggs to swim-up fry averaged 90.39% (Table 5).

Table 5. Survival from green eggs to swim-up fry, Brood Year 1989.

Rapid River and Hells Canyon returns combined.

Eggs Taken	Eyed Eggs	Percent Eye-up	Swim-up Fry	% Survival to Swim-up
4,478,045	4,152,541	92.73	4,047,656	90.39

FISH PRODUCTION

Early Rearing

During the period of January 23 through March 6, 1990, a total of 4,047,656 fry were transferred to raceways. The average size at the time of transfer was 1,297 fish per pound. Loading densities ranged from 486,446 to 590,500 fish per raceway, with an initial water depth of 1.5 feet and water inflow of 0.9 cfs. As fish size increased, water depth and flow were adjusted to a maximum depth of 3 feet and flow of 1.5 cfs per raceway. Density and flow indices were kept below 0.5 and 1.5, respectively, throughout the initial rearing period. Fry size increased to an average of 2.78 inches (137.92 fish per pound) for a conversion of 0.98 during the raceway rearing period.

Final Rearing

Brood Year 1989 fingerlings, totaling nearly 3,205,000 fish, were transferred from the raceways to the final rearing ponds from June 8 through June 15, 1990. Initial pond loading densities are presented in Table 6. Renovations to rearing pond 1 occurred March 26 through May 4, 1990. Prior to ponding fish, pond 1 was disinfected with a 200 ppm chlorine flush. At time of release, the resulting feeding conversion was 1.51.

Table 6. Initial pond loading densities, June 1990.

Pond	Inflow	Millions of fish	Size per pound	Density index	Flow index
IA	12.67 cfs	0.6	202.24	0.03	0.20
1B	12.67 cfs	0.6	191.48	0.06	0.21
2A	8.09 cfs	0.5	175.41	0.05	0.29
2B	8.09 cfs	0.5	169.29	0.06	0.30
2C	6.72 cfs	0.5	165.53	0.06	0.37
2D	6.72 cfs	0.5	175.90	0.05	0.35

Feed Use and Conversion Data

A total of 228,234 pounds of BioProducts feed was used for 1989 Brood Year fish and fingerling outplants. This total was comprised of 224,744 pounds of BioMoist feed and 3,490 pounds of BioDry feed products. Specific data on feed types and sizes used is listed in Appendix 3 of this report. The overall feed conversion for 1989 Brood Year fish was 1.51.

The total cost paid by IPC to operate the Rapid River Hatchery during the period of September 1, 1989 through March 31, 1991 was \$523,990. These costs included fish feed, smolt transportation and marking, hatchery personnel salaries, and operation and maintenance costs. No capital outlay expenditures are included in this total. The resulting cost per pound of 1989 Brood Year fish produced at Rapid River Hatchery was \$3.95 (\$0.166 per smolt released).

FISH HEALTH

Brood Stock

In 1989, overall fish health problems were minimal. Prespawning mortalities resulted in the loss of 315 chinook from the Rapid River run. This represented 11.32% of the run and was comprised of 175 females, 104 males, and 36 jacks. Prespawning mortality for fish collected at Hells Canyon was 8 fish (9.09% of the Hells Canyon run), and included 2 females and 6 males.

All spring chinook, including jacks, were given a single subcutaneous injection of water soluble Erythromycin Phosphate at the rate of 11.0 mg active Erythromycin per kilogram of fish to reduce BKD mortalities.

Formalin treatments were administered at the rate of 80-100 ppm for 1 hour, three days a week to control fungus. Treatments were initiated on June 20 and continued through August 16, 1989. Due to a slight increase in visible fungus, treatments were increased to five days per week on July 20, 1989. Successful fungus control was maintained throughout the remainder of the holding period.

Routine sampling was conducted by IDFG pathology staff throughout the holding and spawning period.

Production Fish

While in the raceways, fry became infected with an external parasite (Ictyobodo necatrix) and were successfully treated with Formalin at a concentration of 167 ppm two times per week.

Following ponding into pond 1AB, transferred fry came into contact with lethal amounts of aluminum which came from newly painted walkways. Approximately 10,500 fry were lost over an 18-day span. Mortality rates remained elevated for over a month before tapering off.

The mortality rate due to Erythrocytic Inclusion Body Syndrome (EIBS) was at a relatively low level in the 1989 Brood Year fish. Reduced mortality, compared to past years, may possibly be due to the exclusive use of BioProducts moist feed which was supplemented with a vitamin pack. The fortified BioProducts feed included five times the vitamins C and B12, and ten times the amount of Folic Acid found in the unfortified version.

IDFG pathology staff from the Eagle Fish Health Laboratory checked Brood Year 1989 fish six times between June 6, 1990 and February 22, 1991. Tests indicated EIBS was present at the hatchery, but numbers sampled were too low for positive confirmation.

FISH MARKING/CWT DATA

A portion of the 1989 brood inventory was marked between September 4-13, 1989 in accordance with the U.S./Canada treaty. These fish will serve as one of the indicators of Idaho's contribution to the ocean harvest. Coded wire tags and some freeze brands were used during this project. Overall marking efficiency was 91.57%.

FISH DISTRIBUTION

Fingerling Releases

During June and July 1990, approximately 760,000 fingerlings, surplus to Rapid River Hatchery production needs, were transferred to the Crooked River Rearing Ponds and to the Sawtooth Fish Hatchery. Specific transfer data is presented in Table 7.

Table 7. Fingerling transfers, Brood Year 1989.

Transfer Date	Transfer Site	Number Transferred	Fish per lb	Total Length (in)
6/07/90	Crooked River Rearing Ponds	211,209	224.08	2.38
7/02/90	Sawtooth Hatchery	341,160	113.72	2.99
7/17/90	Sawtooth Hatchery	207,716	115.40	2.97
Total Fingerling Transferred:		760,085		

Smolt Releases

Volitional smolt releases from Rapid River Hatchery began on March 15, 1991, at which time fish averaged 24 fish per pound (Table 8). From visual observations made, it was estimated that approximately 1.9 million smolts had migrated out of the rearing ponds between March 15 and March 31, 1990.

Table 8. Rearing densities at time of smolt release, March 1991.

Pond	Inflow	Millions of fish	Size per pound	Density index	Flow index
1AB	16.04cfs	1.2	24.43	0.17	1.37
2AB	5.12cfs	1.0	21.94	0.21	3.77
2CD	5.41cfs	1.0	22.35	0.21	3.53

IPC transport tankers planted 500,500 smolts in the Snake River directly below Hells Canyon Dam during March 19-21, 1991. On March 21, 1991, 100,100 smolts were planted at the mouth of Hazard Creek on the Little Salmon River. All remaining Rapid River smolts were flushed from the rearing ponds directly into Rapid River on April 5, 1991. Plant size and number data is presented in Table 9.

Table 9. Smolt releases, Brood Year 1989.

Date	Planting site	Number Planted	Number/Pound
<u>SNAKE RIVER</u>			
3/19/91	Below Hells Canyon Dam	100,100	22.5
3/19/91	Below Hells Canyon Dam	100,100	22.5
3/20/91	Below Hells Canyon Dam	100,100	22.5
3/20/91	Below Hells Canyon Dam	100,100	22.5
3/21/91	Below Hells Canyon Dam	100,100	22.5
	Subtotal	500,500	
<u>LITTLE SALMON RIVER</u>			
3/21/91	Upriver .8 miles from mouth of Hazard Creek	100,100	22.5
	Subtotal	100,100	
<u>RAPID RIVER</u>			
3/15/91	Volitional Release	1,900,000	24.2
4/03/91			
4/04/91	Remaining fish forced out of ponds	664,900	
4/05/91			24.2
	Subtotal	2,564,900	
	HATCHERY TOTAL	3,165,500	

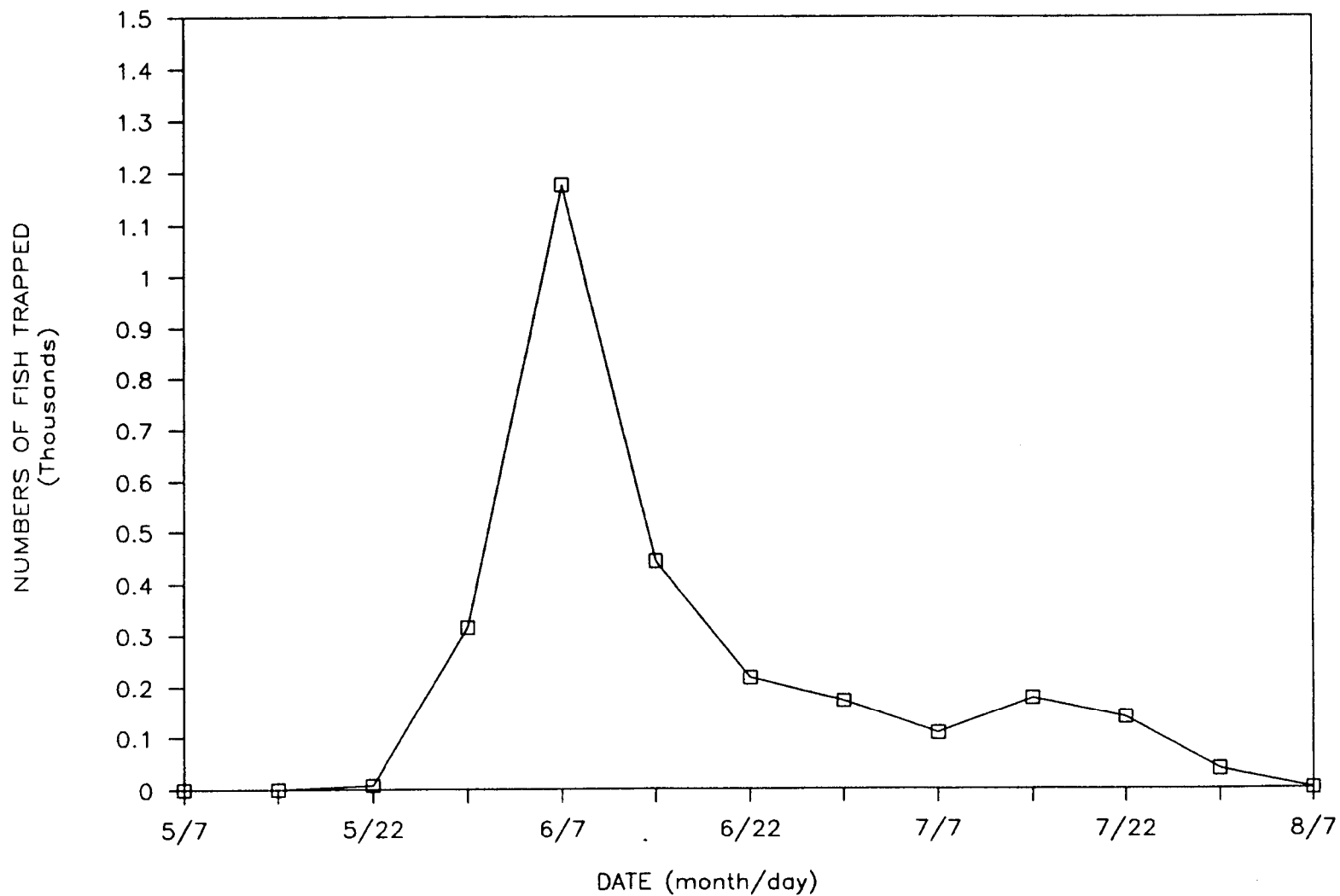
ACKNOWLEDGEMENTS

The crew at Rapid River Hatchery would like to thank Paul Abbott and the entire fisheries staff at Idaho Power Company for their support and assistance in helping us improve the hatchery facility. We would also like to thank the staff from the Idaho Department of Fish and Game hatcheries and U.S. Forest **Service** personnel for helping us take eggs during the spawning season; our local Conservation Officers, Eldon Anglen and Roy Kinner, for helping with enforcement work at the hatchery; and Larry Basham for compiling tag/brand quality and retention data on the 1989 Brood Year smolts. In addition, we would also like to thank the Eagle Fish Health Laboratory pathology staff for doing disease diagnostic work at the hatchery.

APPENDICES

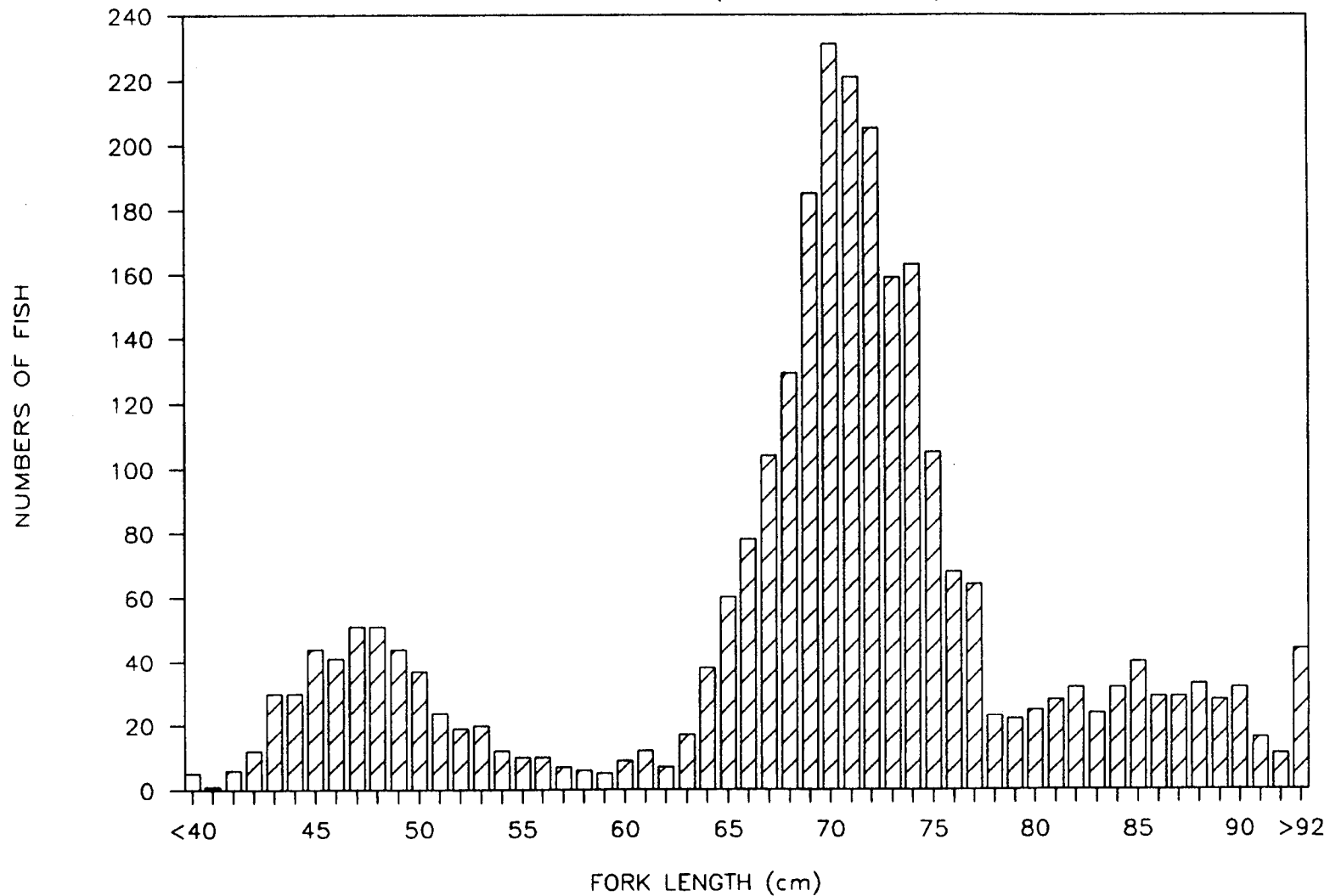
RAPID RIVER CHINOOK TRAPPING – 1989

SPRING CHINOOK WEEKLY TRAP COUNT



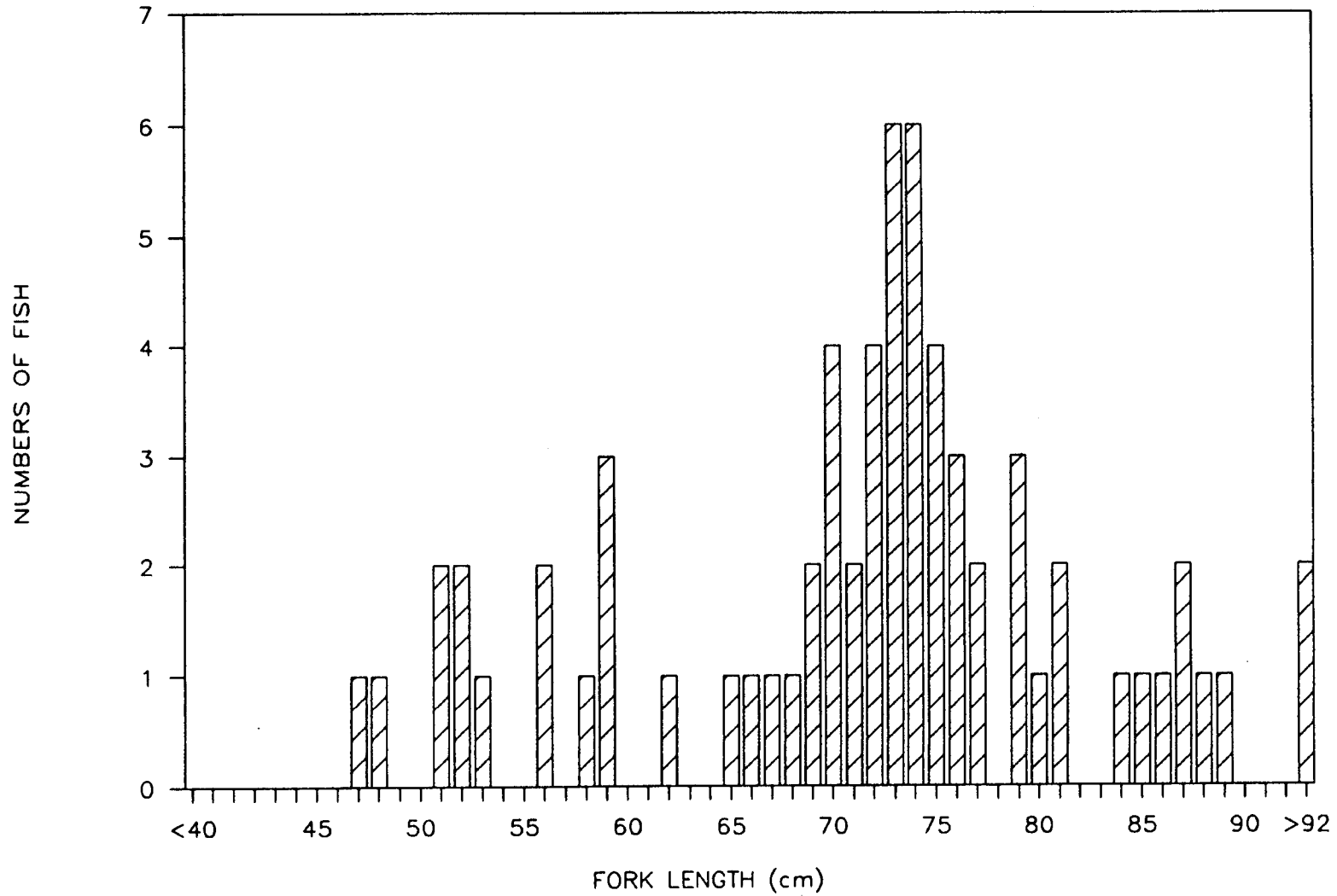
RAPID RIVER SPRING CHINOOK — 1989

LENGTH FREQUENCY (FORK LENGTH cm)



RAPID RIVER SUMMER CHINOOK – 1989

LENGTH FREQUENCY (FORK LENGTH cm)



Appendix 4. Rapid River adult steelhead length frequency data, 1989.

Fork Length (cm)	Hatchery Origin		Wild Origin	
	Male	Female	Male	Female
35			1	
50				
51				
52				
53	1	1		
54				
55				
56				
57				1
58			1	
59	1	2		1
60		1	1	1
61	1	1	3	3
62			1	
63			3	
64	1		1	
65			2	2
66			4	
67		1	1	
68				
69			2	1
70	1		1	2
71				5
72				5
73				2
74				3
75		1		1
76				7
77				3
78				1
79		1	1	2
80				2
81				1
82				1
83				1
84				1
SUBTOTALS	5	8	22	46

Appendix 5. Spring chinook egg take information, Brood Year 1989.

Lot	Date Spawned	Number Females	Number Green Eggs	Average Eggs Per Female	Number Eyed	Percent Eye-Up	Second Pick	Eggs/Fry Remaining
1	8/02	2	15,550	7,775	1,300	8.36	170	1,130
2	8/15	12	54,568	4,547	40,944	75.03	931	40,013
3	8/18	27	137,950	5,109	110,965	80.44	7,089	103,876
4	8/22	120	515,492	4,296	479,167	92.95	11,000	468,166
5	8/25	182	753,328	4,139	714,543	94.85	13,994	700,549
6	8/29	342	1,464,060	4,281	1,337,203	91.34	32,482	1,304,721
7	9/01	251	1,001,487	3,990	962,344	96.09	13,573	948,771
8	9/05	116	424,494	3,659	400,887	94.44	8,592	392,295
9	9/08	25	92,416	3,697	87,437	94.61	1,963	85,474
10	9/13	5	18,700	3,740	17,750	94.92	60	17,690
Totals		1,082*	4,478,045	4,139	4,152,541	92.73	89,855	4,062,685

*Includes 40 Hells Canyon

Appendix 6. Marking/release summary, Brood Year 1989.

Date	Released	Tao Type	Tao Code	Tags Released	Site Released
3/15	- 4/5/91	CWT	10/34/01	19,500	Rapid River
3/15	- 4/5/91	CWT	10/34/02	19,359	Rapid River
3/15	- 4/5/91	CWT	10/34/03	19,198	Rapid River
3/15	- 4/5/91	CWT	10/34/04	19,537	Rapid River
3/15	- 4/5/91	CWT	10/34/05	20,438	Rapid River
3/15	- 4/5/91	CWT	10/34/06	19,704	Rapid River
3/15	- 4/5/91	CWT	10/34/07	18,763	Rapid River
		& FB	RA-> I-1		
3/15	- 4/5/91	CWT	10/34/08	19,141	Rapid River
3/15	- 4/5/91	CWT	10/34/09	19,856	Rapid River
3/15	- 4/5/91	CWT	10/34/10	19,556	Rapid River
3/15	- 4/5/91	CWT	10/34/11	20,026	Rapid River
3/15	- 4/5/91	CWT	10/34/12	19,757	Rapid River
3/15	- 4/5/91	CWT	10/34/13	19,600	Rapid River
3/15	- 4/5/91	CWT	10/34/14	20,525	Rapid River
		& FB	RD-> I-1		
3/15	- 4/5/91	CWT	10/34/15	19,878	Rapid River
		& FB	RD-> I-3		
			Total	294,838	

Appendix 7. Feed and growth information based on data for spring chinook salmon at Rapid River Hatchery, 1980-1989.

Month	Average Water Temperature (F)	Density Index	Flow Index	Feed Conversion	Hatchery Constant	Average Daily Length Increase	Monthly Length Increase	Condition C. Factor	% Body Weight Fed	Number of Feedings Per Day	Average # Per Pound At End of Month	Average Length At End of Month
February	38	N/A	N/A	3.00	1.98	0.0022	0.07	0.00026	1.42	8	1084	1.53
March	41	0.25	0.54	1.30	2.85	0.0073	0.22	0.00028	1.89	8	847	1.62
April	44	0.28	0.50	1.00	3.50	0.0117	0.35	0.00030	2.40	8	461	1.93
May'	46	0.28	0.68	2.00	4.80	0.0080	0.24	0.00032	2.30	8	293	2.25
June	48	0.07	0.76	1.19	7.50	0.0210	0.63	0.00033	2.93	4	141	2.87
July	53	0.09	0.87	1.56	7.49	0.0160	0.48	0.00033	2.75	4	79	3.48
August	54	0.12	1.39	1.61	8.21	0.0170	0.51	0.00035	2.70	5	49	3.88
September	50	0.14	1.60	1.55	9.00	0.0170	0.51	0.00035	2.00	5	36	4.30
October	46	0.16	1.64	2.17	6.05	0.0093	0.28	0.00035	1.37	3	30	4.57
November	41	0.17	1.87	3.71	1.89	0.0017	0.05	0.00035	0.41	2	29	4.62
December	38	0.16	1.90	4.50	0.95	0.0007	0.00	0.00035	0.21	1	30	4.57
January	37	0.18	1.95	4.50	0.95	0.0007	0.00	0.00035	0.21	1	30	4.57
February	38	0.18	2.10	2.50	2.48	0.0033	0.10	0.00032	0.53	2	27	4.87
March	41	0.19	1.95	1.80	4.48	0.0083	0.25	0.00032	0.92	2	23	5.14

Growth data may vary during periods of high water.

Appendix 8. Returns of spring chinook to Rapid River Hatchery and enumeration of eggs, 1964-1989.

Return Year	Snake River Returns (Adults)	Rapid River Returns (Adults)	Rapid River Returns (Jacks)	Percent Prespawn Mortality	Females Spawned	Eggs/ Female	Number of Eggs Taken
1964	349			16	182	4,874	887,000
1965	408			21	133	4,541	604,000
1966	1,511			18	621	3,697	2,296,000
1967	974		1,039	11	581	3,537	2,055,000
1968	351	3,416	740	2	1,809	3,671	6,540,000
1969	672	2,817	1,043	8	1,415	3,655	5,151,697
1970		6,470	887	10	3,520	4,136	14,560,280
1971		3,357	1,754	19	1,722	3,507	6,038,785
1972		12,310	943	15	3,825	3,941	15,072,604
1973		17,054	286	37	3,454	3,912	13,510,465
1974		3,457	538	27	1,756	3,924	6,890,186
1975		4,428	573	7	2,184	3,894	8,503,606
1976		6,342	1,765	15	3,055	3,762	11,492,878
1977		7,767	437	11	3,781	3,745	14,160,330
1978		5,735	34	21	2,350	4,266	10,026,888
1979		3,054	350	31	1,141	4,950	5,648,722
1980		1,528	432	30	543	3,235	1,756,827
1981		3,087	176	7	1,666	3,675	6,122,273
1982		3,646	30	11	1,883	3,973	7,482,330
1983		1,864	94	15	859	4,015	3,449,471
1984		1,705	651	7	821	3,807	3,125,911
1985		6,376	351	8	2,962	3,741	11,535,461*
1986		6,546	177	34	2,451	4,355	10,673,138*
1987		3,598	210	30	1,310	4,379	5,656,145*
1988		3,608	172	19	1,645	4,879	7,905,702*
1989		2,372	428	11	1,082	4,139	4,478,045*

* Includes eggs taken from Hells Canyon adults.

Appendix 9. Summary of spring chinook returns to Rapid River by Brood Year*, 1964 - 1989.

Brood Year	Year Released	Number Released	3 Year Olds	Year Returned	4 Year Olds	Year Returned	5 Year Olds	Year Returned	Total Brood Year Return	% Return From Plant
1964	1966	588,000	1,309	1967	3,422	1968	197	1969	4,658	0.80
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.89
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,416	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,370	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,413,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,206	1983	4,291	0.16
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,473,733	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986	1,155	1987	6,596	0.20
1983	1985	2,491,238	177	1986	2,444	1987	1,557	1988	4,178	0.17
1984	1986	1,594,688	210	1987	2,051	1988	379	1989	2,640	0.17
1985	1987	2,836,400	172	1988	1,933	1989	135	1990	2,300	0.08
1986	1988	2,630,200	428	1989	2,431	1990	421	1991	3,280	0.12
1987	1989	2,319,500	40	1990	1,254	1991		1992		
1988	1990	2,520,400	238	1991		1992		1993		
1989	1991	2,564,900		1992		1993		1994		

*Year classes based on length frequency information.

Appendix 10. Rapid River Hatchery feed use data for Brood Year 1989.

Feed Size	Type	Pounds
No. 2 Starter	BioDiet	730
	BioDry	308
No. 3 Starter	BioDiet	3,916
	BioDry	1,232
1.0 mm (1/32")	BioDiet	6,750
	BioDry	950
1.3 mm (3/64")	BioDiet	1,700
	BioDry	1,000
Ery Med	BioMoist	3,960
1.5 mm (1/16")	BioMoist	11,700
Ery Med	BioMoist	7,650
2.5 mm (3/32")	BioMoist	10,200
Ery Med	BioMoist	21,000
3.0 mm (1/8 ")	BioMoist	147,538
	OMP	9,600
	HATCHERY TOTALS	228,234

* This number represents the entire amount of feed purchased for Rapid River Hatchery brood year 1989 production and for stock reared at Rapid River Hatchery and outplanted as fry/fingerling releases.

Appendix 11. Summary of eggs, fry, fingerlings, and smolts planted or transferred from Rapid River Hatchery, 1964-1989.

Brood Year	No. Eggs Taken	Eggs/Fry Transfers, Plants, & Sites	Smolt Transfers, Plants, and Sites	Fish/Pound
1964	887,000	None	588,000 Rapid River	22.6
1965	604,000	None	479,267 Rapid River	23.2
1966	2,296,000	None	1,460,150 Rapid River	25.0
1967	2,055,000	None	900,192 Rapid River	24.0
1968	6,540,000	757,376 eggs, Clearwater H Channel	3,172,000 Rapid River	20.0
1969	5,171,697	497,000 eggs, Dworshak NFH to Kooskia NFH	2,718,720 Rapid River	21.0
1970	14,560,280	4,417,454 eggs, Sweetwater Eye Station 2,224 eggs, Kooskia NFH 526,516 eggs, Hayden Creek Hatchery 2,473,983 eggs, Clearwater H Channel 4,607,736 eggs, Rapid River Hatchery 200,520 fry, Lemhi River 353,970 fry, Decker Pond 100,000 fry, Sandpoint Hatchery	2,809,200 Rapid River 91,800 Lochsa River	19.4
1971	6,038,785	600,000 eggs, Hayden Creek Hatchery 53,562 fry, Lemhi River 104,300 fry, Red River 29,800 fry, Ten Mile Creek 44,700 fry, American River 14,900 fry, Papoose Creek 59,600 fry, Brushy Creek 44,700 fry, Fish Creek 14,900 fry, Post Office Creek 44,700 fry, Squaw Creek (Lochsa) 61,500 fry, Lochsa River 60,000 fry, Ten Mile Creek 200,880 fry, Sandpoint Hatchery 401,305 fry, Decker Pond	197,303 S.F. Clearwater 2,908,425 Rapid River	17.0
1972	15,072,604	5,256,662 eggs, Sweetwater Eye Station 3,012,358 eggs, Hayden Creek Hatchery 1,293,592 eggs, Red River H Channel 4,878,017 eggs, Rapid River Hatchery	2,707,917 Rapid River	17.5
1973	13,510,464	3,915,900 eggs, Sweetwater Eye Station 1,295,424 eggs, Hayden Creek Hatchery 104,760 eggs, Hagerman Hatchery 502,200 eggs, Crooked River H Channel 702,000 eggs, Kooskia NFH 806,400 eggs, Hayden Creek Hatchery 504,000 eggs, Minnesota-walleye trade 210,734 fry, Sandpoint Hatchery 206,360 fry, Kooskia Hatchery 88,480 fry, Ten Mile Creek 18,200 fry, Newsome Creek 633,000 fry, Lemhi River 10,428 fry, Capehorn Creek	117,000 S.F. Clearwater 3,373,700 Rapid River	14.8
1974	6,890,186	809,400 eggs, Hayden Creek Hatchery 407,012 eggs, Indian Creek 5,203,273 eggs, Rapid River Hatchery 203,500 fry, Sandpoint Hatchery 21,840 fry, Capehorn Creek 59,962 fry, Red River 30,750 fry, Newsome Creek 10,250 fry, Ten Mile Creek 1,140,300 fry, Lemhi River	205,700 S.F. Clearwater 3,358,940 Rapid River	18.4

Appendix 11. Continued.

Brood Year	No. Eggs Taken	Eggs/Fry Transfers, Plants, & Sites	Smolt Transfers, Plants, and	Fish/ Pound
1975	8,503,606	2,363,200 eggs, Sweetwater Eye Station 252,200 eggs, Mullan Hatchery 255,000 eggs, Hayden Creek Hatchery 280,659 eggs, Indian Creek H Channel 4,906,492 eggs, Rapid River Hatchery 34,000 fry, Ten Mile Creek 156,000 fry, Lemhi River 65,960 fry, S.F. Clearwater River 412,800 fry, Decker Pond 209,950 fry, Sandpoint Hatchery 36,143 fry, Bear Valley Creek	249,750 S.F. Clearwater 2,921,172 Rapid River	15.9
1976	11,492,878	1,161,608 eggs, Mullan Hatchery 2,937,994 eggs, Sweetwater Eye Station 261,900 eggs, Hayden Creek Hatchery 261,900 eggs, Sandpoint Hatchery 1,267,208 eggs, Mackay Hatchery 5,009,482 eggs, Rapid River Hatchery 47,008 fry, University of Idaho, Fish Coop. 104,500 fry, Lolo Creek 501,600 fry, Red River Pond 80,600 fry, S.F. Clearwater River	2,413,678 Rapid River	15.7
1977	14,160,330	2,633,400 eggs, Sweetwater Eye Station 2,287,800 eggs, Kooskia NFH 2,689,000 eggs, Mullan Hatchery 288,000 eggs, Hayden Creek 20,700 eggs, University of Idaho 1,007,340 eggs, Crooked River H Channel 5,098,587 eggs, Rapid River Hatchery 723,000 fry, Mackay Hatchery 50,800 fry, Decker Pond 200,025 fry, Red River Pond 265,600 fry, Lemhi River	2,866,993 Rapid River 156,362 White Sand 44,373 Newsome Creek	15.0
1978	10,026,888	767,322 eggs, Hayden Creek Hatchery 970,728 eggs, Mackay Hatchery 1,540,282 eggs, Sweetwater Eye Station 706,936 eggs, Dworshak NFH 38,160 eggs, University of Idaho 10,864 eggs, University of Idaho (Hayden Creek) 1,250,010 eggs, Crooked River H Channel 249,969 eggs, Sweetwater Eye Station 232,500 fry, Red River Pond 10,000 fry, Ten Mile Creek	57,440 White Sand 2,604,823 Rapid River	15.0
1979	5,646,722	806,400 eggs, Hayden Creek Hatchery 330,880 eggs, Dworshak NFH 293,249 fry, Red River Pond	1,001,700 Snake River 2,372,607 Rapid River	21.0 17.9
1980	1,756,827	None	1,473,733 Rapid River	28.0
1981	6,122,273	608,384 eggs, Pahsimeroi Hatchery 256,608 eggs, Oxbow Hatchery 449,280 eggs, Dworshak NFH 4,409,036 eggs, Rapid River Hatchery	250,020 Snake River 2,998,103 Rapid River	27.0 22.0
1982	7,420,450	493,346 eggs, Looking Glass (Oregon) 1,332,000 eggs, Pahsimeroi Hatchery 375,028 eggs, Dworshak NFH 125,055 eggs, Hagerman NFH 4,614,863 eggs, Rapid River Hatchery 306,000 fry, Red River Pond	500,850 Snake River 3,246,197 Rapid River	27.0 20.0
1983	3,449,471	None	437,360 Snake River 2,491,238 Rapid River	27.0 23.0

Appendix 11. Continued.

Brood Year	No. Eggs Taken	Eggs/Fry Transfers.	Plants. & Sites	Smolt Plants, Transfers, and Sites	Fish/Pound
1984	3,125,911* 217,181*	152,000 fry,	Red River	140,000 Snake River	20.0
				136,800 Red River	30.0
		*Red River		1,594,688 Rapid River	22.0
1985	11,535,461	497,520 eggs,	Oregon	103,000 Snake River	31.1
		3,668,000 eggs,	Dworshak NFH	2,836,400 Rapid River	22.5
		2,450,907 eggs,	Sawtooth Hatchery		
		100,590 fry,	Boulder Creek		
		349,650 fry,	Crooked River		
		200,158 fry,	Eldorado Creek		
		55,123 fry,	Hopeful Creek		
		144,443 fry,	Crooked Fork		
		70,282 fry,	White Sands Creek		
		49,437 fry,	Ten Mile Creek		
		102,282 fry,	Newsome Creek		
		115,352 fry,	Brushy Fork		
1986	10,673,138	2,368,400 eggs,	Dworshak NFH	400,600 Snake River	19.8
		712,905 eggs,	Sawtooth Hatchery	2,630,200 Rapid River	19.2
		7,591,833 eggs,	Rapid River Hatchery		
		348,600 fry,	Crooked Fork		
		202,400 fry,	White Sand Creek		
		98,000 fry,	Big Flat Creek		
		238,900 fry,	Red River Pond		
1987	5,656,145	30,000 fry,	Little Salmon River	500,000 Snake River	20.0
		103,800 fry,	Lolo Creek	2,319,500 Rapid River	22.0
		53,200 fry,	El Dorado Creek		
		137,800 fry,	Crooked Fork Creek		
		62,200 fry,	Hopeful Creek		
		108,300 fry,	White Sand Creek		
		72,200 fry,	Big Flat Creek		
		19,500 fry,	White Sand Creek		
		113,800 fry,	American River		
		112,100 fry,	Newsome Creek		
		100,100 fry,	Meadow Creek		
		200,100 fry,	Crooked River		
		50,100 fry,	Red River		
		50,100 fry,	Yankee Fork		
		202,000 fry,	Brushy Fork		
		150,100 fry,	Ten Mile Creek		
		100,200 fry,	White Sand Creek		
		1,475,677 eggs,	Oregon Fish & Wildlife	551,200 Snake River	30.0
		149,570 fry,	Little Salmon River	250,000 L. Salmon River	27.8
		100,278 fry,	10 Mile Creek	2,520,400 Rapid River	26.0
		149,570 fry,	Little Salmon River		
		100,278 fry,	10 Mile Creek		
		101,062 fry,	Crooked River		
		100,862 fry,	Crooked River		
		100,628 fry,	Newsome Creek		
		100,299 fry,	Boulder Creek		
		100,342 fry,	Boulder Creek		
		100,097 fry,	Newsome Creek		
		195,398 fry,	Brushy Fork		
		99,919 fry,	White Sands Creek		
		100,148 fry,	White Sands Creek		
		99,401 fry,	American River		
		51,369 fry,	American River		
		39,163 fry,	Meadow Creek		
		211,209 fry,	Crooked River	500,500 Snake River	22.5
		548,876 fry,	Sawtooth Hatchery	100,100 L. Salmon River	22.5
				2,564,900 Rapid River	24.2

Appendix 12. Run timing of spring chinook to the Rapid River trap, 1989.

Date		Number of Fish	Percent of Total Run
May	01-07	0	0.00%
	08-15	0	0.00%
	16-22	8	0.29%
	23-31	315	11.25%
June	01-07	1,176	42.00%
	08-15	443	15.82%
	16-22	217	7.75%
	23-30	171	6.11%
July	01-07	108	3.86%
	08-15	176	6.29%
	16-22	138	4.93%
	23-31	38	1.36%
Aug.	01-07	1	0.04%
Run Total		2,800	100.00%

Appendix 13. Fork length data for 1989 Rapid River spring chinook run.

Fork Length (cm)	Number of Fish	Fork Length (cm)	Number of Fish
Less than 40	5	82	32
40	1	83	24
41	6	84	32
42	12	85	40
43	30	86	29
44	30	87	29
45	44	88	33
46	41	89	28
47	51	90	32
48	51	91	16
49	44	92	11
50	37	Greater than 92	44
51	24	Run total	2,800
52	19		
53	20		
54	12		
55	10		
56	10		
57	7		
58	6		
59	5		
60	9		
61	12		
62	7		
63	17		
64	38		
65	60		
66	78		
67	10		
68	129		
69	185		
70	231		
71	22		
72	20		
73	159		
74	163		
75	105		
76	68		
77	64		
78	23		
79	22		
80	25		
81	28		

Sex Composition Data			
Jacks			428
Adult Males			1,151
Adult Females			1,221
Run Total			2,800

Chinook Age Class Data			
3 Year Olds			428
4 Year Olds			1,993
5 Year Olds			379
Run Total			2,800

Age Determination Structure			
0 - 53 cm =			3 Year Olds
54 - 80 cm =			4 Year Olds
81 - > cm =			5 Year Olds

Appendix 14. Fork length data for 1989 Rapid River summer chinook run.

Fork Length (cm)	Number of Fish	Fork Length (cm)	Number of Fish
Less than 40	0	72	4
40	0	73	6
41	0	74	6
42	0	75	4
43	0	76	3
44	0	77	2
45	0	78	0
46	0	79	3
47	1	80	1
48	1	81	2
49	0	82	0
50	0	83	0
51	2	84	1
52	2	85	1
53	1	86	1
54	0	87	2
55	0	88	1
56	2	89	1
57	0	90	0
58	1	91	0
59	3	92	0
60	0	Greater than 92	2
61	0	Run total	82
62	1		
63	0		
64	0		
65	1		
66	1		
67	1		
68	1	Jacks	13
69	2	Adult Males	41
70	4	Adult Females	28
71	2	Run Total	82

Submitted by:

Tom Levendofske
Hatchery Superintendent III

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME


Steven M. Huffaker, Chief
Bureau of Fisheries


Bill Hutchinson
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